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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
WALTER, CRAIG E	

ART UNIT	PAPER NUMBER
2188	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/663,700	KIMURA ET AL.	
	Examiner	Art Unit	
	CRAIG E. WALTER	2188	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 April 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-14,19 and 20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-14,19 and 20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 10 April 2008 has been entered.

Status of Claims

2. Claims 1-14, 19 and 20 are pending in the Application.

Claims 1, 3, 4, 11 and 19 have been amended.

Claims 15-18 remain cancelled.

Claim 20 is new.

Claims 1-14, 19 and 20 are rejected.

Response to Amendment

3. Applicant's amendments and arguments filed on 10 April 2008 in response to the office action mailed on 14 May 2007 have been fully considered, but they are not persuasive. Therefore, the rejections made in the previous office action are maintained, and restated below, with changes as needed to address the amendments.

Remarks

4. Examiner acknowledges the expiration of Applicant's initiated three month suspension (15 October 2007 through 15 January 2008).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1, 3, 4, 8, 9, 11-13, 19 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Arimilli et al. (US PG Publication 2003/0009640 A1), hereinafter Arimilli, and in further view of Moran et al. (US Patent 7,139,890 B2), hereinafter Moran.

As for claim 1, Arimilli teaches a cache control method in a computer system that includes a storage device having a plurality of physical devices for storing data (Fig. 1 (elements 14 depict multiple processing devices, each of which comprising a physical device (i.e. cache for storing data))), at least one client (Fig. 1, element 12), a relay device which relays data between said storage device and the at least one client (Fig. 1, element 15 – the switch connects the client and processing devices), a cache disk module for caching processed data being relayed between said storage device and staid at least one client (Fig. 1, element 22 – the cache is used to store information sent between the client and NUMA computer system node (Fig. 1,element 12)) , (the

processing devices, client, switch, and arrows depicting paths of communication comprise the network), the cache control method comprising:

a relay device, and a client device connected mutually via a network (referring to Fig. 1, the system includes a plurality of host/client nodes (12) which are connected via a network switch (15). Each node contains, *inter alia*, a memory (26) and a cache (22)), the cache control method comprising:

relating data processed in the computer system with attribute data which configures a caching operation of the cache disk module that caches the processed data on a primary network which connects said at least one client and said relay device to each other (referring to Fig. 4, the page table entry (PTE) stores, *inter alia*, a physical page number (98), a no intent to cache bit (110), and a node write through bit (108) – paragraphs 0046 through 0047, all lines. The latter two bits help the system to determine if the associated data should be cached, or not cached (i.e. written through to the memory) – paragraphs 0048 through 0049, all lines. Note in Fig. 1, the node (12) to switch (15) network (e.g. primary) is not the same as the storage (depicted in Fig. 1 by the large box separated by dashed lines) to switch (15) network (e.g. secondary)); and

mediating the processed data between the storage device and the at least one client device via a secondary network, which connects said relay device and said storage device to each other, without the cache operation of the cache disk module when the attribute data prohibits the caching operation (data received by a node within the network is processed within the node based on the status of a

plurality of write through indicators (when an indicator is set, the data is written back to the main memory rather than being cached – paragraph 0013, all lines). Note paragraphs 0025 through 0026, all lines, describe data sharing among the nodes and additional attached devices. Note in Fig. 1, the node (12) to switch (15) network (e.g. primary) is not the same as the storage (depicted in Fig. 1 by the large box separated by dashed lines) to switch (15) network (e.g. secondary)).

wherein a plurality of virtual volumes are formed on said physical devices, and each of said at least one client is assigned to at least one of said virtual volumes, thereby permitting said each of said at least one client to access data stored in said at least one of said virtual volumes to which it is assigned (paragraph 0040 and 0046, all lines – the physical memory of each device is abstracted in virtual addresses which are comprised of virtual segments/pages (i.e. volumes)). Also note, each node is permitted to access the physical and virtual volumes in each node located on both the primary and secondary networks (paragraphs 0036 through 0037, all lines – coherency is established between all node),

wherein said attribute data is held in a cache attribute management table which stores a plurality of entries each of which sets a corresponding relation between identification information identifying one of said virtual page/segment (Fig. 4, element 92 – paragraph 0046, all lines), and an indication whether data stored in said one of said physical devices is cacheable or not (when an indicator

is set, the data is written back to the main memory rather than being cached – paragraph 0013, all lines), and

wherein said each entry of said cache attribute management table further sets a corresponding relation between an indication as to whether data to be read from a physical device forming part of said one of said virtual volumes is cacheable or not and an indication as to whether data to be written to said physical device forming part of said one of said virtual volumes is cacheable or not (paragraph 0013 – Arimilli clearly discloses the use of a write through indicator. The write through indicator serves as flag to determine if data access (i.e. data written to a physical device, or read from a physical device) is to be written through (i.e. not-cached) or not written through (i.e. cached). Since this indicator serves as an indication of when and when not to cache data access requests, it serves as an indicator whether data to be written to and read from, the physical device should be cached or not).

Despite these teachings Arimilli fails to specifically teach his cache disk modules as being located in the relay device (i.e. switch). Additionally he fails to teach storing identification information identifying one of the physical devices (he only teaches identifying virtual addresses/volumes).

Moran however teaches a method and an arrangement to interface memory, which includes a switch (i.e. hub – Fig. 1, element 110, which contains a memory, element 130). Additionally, Moran teaches storing a device ID in a table in order for the system to identify a memory or memory location to be referenced (col. 11, lines 26-44).

It would have been obvious to one of ordinary skill in the art at the time of the invention for Arimilli to further include Moran's method and an arrangement to interface memory into his own NUMA data processing system. By doing so, Arimilli could benefit by having a more secure NUMA system which can mitigate the risk of potentially hostile code to access the data within his system as taught by Moran in col. 1, lines 36-60.

Claims 3, 11 and 19 are rejected based on the same rationale as claim 1.

As for claim 4, Arimilli teaches the relay device according to claim 3, further comprising:

> A volatile memory for the caching, wherein the mediation unit mediates the processed data between the storage device and the at least one client device via the secondary network, by primarily using the volatile memory and secondarily using the cache disk module (referring to paragraph 0004, all lines, Arimilli teaches the use of volatile memory (i.e. RAM) as being used in a computer system for caching. Additionally note (referring to Fig. 1), Arimilli teaches each node as receiving data from the network via the node controller (16), at which point the data must traverse a path via one or more of the processing units (i.e. element 14) before it is stored in memory (26). In other words, the primary path is through the processing unit (containing the cache). By default the data is stored within the cache unless caching indicators are set to indicate that the data is to written directly through (without caching) to the system memory).

As for claim 8, Arimilli teaches the relay device according to claim 3, wherein the attribute data is included in the processed data, and the obtaining unit obtains the attribute data from the processed data (paragraph 0048, all lines, the CPU sends the data along with the indicator to instruct the hierarchy not to hold the data in cache).

As for claims 9 and 13, Arimilli teaches the relay (and storage) device according to claims 3 and 11 respectively, wherein the attribute data is associated with a data storage block of the storage device for storing the processed data (paragraphs 0046 through 0047, all lines, the no intent to cache and node write through fields are stored within each PTE entry, which stores each corresponding physical page number), and the obtaining unit obtains the associated attribute data from the storage device via the network in advance of mediation by the mediation unit (the CPU must obtain and process the indicator bits stored, then subsequently notify the node of the status before the mediation unit can determine if the data from the network is to be written to the cache or through to the system memory – paragraphs 0048 through 0049, all lines).

As for claim 12, Arimilli teaches the storage device according to claim 11, wherein the relation unit comprises:

an additional module that adds the attribute data to the processed data, and the added attribute data is mediated together with the processed data (paragraph 0048, all lines, the CPU sends the data along with the indicator to instruct the hierarchy not to hold the data in the cache).

As for claim 20, Arimilli teaches his primary and secondary networks as being different from one another (Fig. 1, the node (12) to switch (15) network (e.g. primary) is

not the same as the storage (depicted in Fig. 1 by the large box separated by dashed lines) to switch (15) network (e.g. secondary)).

6. Claims 2, 5-7, and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combined teachings of Arimilli (US PG Publication 2003/0009640 A1) and Moran (US Patent 7,139,890 B2) as applied to claims 1, 3, and 11, and in further view of Benantar (US PG Publication 2002/0144119 A1).

As for claims 2 and 5, though Arimilli teaches all of the limitations of claim 1, he fails to teach encrypting the processed data. Benantar however teaches network authentication processing via data encryption. More specifically, Benantar teaches encrypting processed network data via a public key (Fig. 6, element 606).

As for claim 6, though Arimilli fails to teach the limitations of this claim, Benantar however discloses an encryption obtaining unit that obtains encryption attribute data related with the processed data, wherein the encryption attribute data configures an encryption operation that encrypts the data (referring again to the flow chart illustrated by Fig. 6, an attribute certificate is generated based on the keys which are used to determine how the encryption process is to be carried out). Additionally, Benantar teaches an encryption unit that encrypts the data when the encryption attribute data requires the encrypting operation (Fig. 6 demonstrates the flow of how the encryption process occurs based on generating the certificate from the public and private key data).

As for claim 7, though Arimilli fails to teach storing key data, Benantar discloses a volatile memory for storing key data used for generating the encrypted data (referring to

Fig. 5, the keystore (518) is used to store the key data. Note paragraph 0031, all lines, the storage areas are described as either consisting of non-volatile or volatile memory).

As for claim 14, though Arimilli teaches all of the limitations of claim 11, he fails to the remaining limitations of this claim. Benantar however teaches a key management unit that manages key data used for encrypting the data cached in the cache disk module (Fig. 5, element 510 illustrates the SSO manager which manages the keys in the keystore (518) used to encrypt the data). Additionally, Benantar discloses a key notification module that notifies the node device of the managed key data (referring again to Fig. 6, the authentication information generated (which was based on the key information) is transmitted to the client to notify the client of the key information used to encrypt the data).

It would have been obvious to one of ordinary skill in the art at the time of the invention for Arimilli in further view of Moran to further include Benantar's encryption system into his own NUMA data processing system. By doing so, Arimilli would benefit by having a means of protecting data within nodes from unauthorized access across his network system as taught by Benantar (paragraph 0004, all lines).

7. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combined teachings of Arimilli (US PG Publication 2003/0009640 A1) and Moran (US Patent 7,139,890 B2) as applied to claim 3 above, and in further view of Matsumoto (US Patent 5,737522).

As for claim 10, though Arimilli teaches obtaining attribute data from the data processed within the network, and teaches switching between caching an not caching of

the processed data, he fails to teach notifying the occurrence of an error in the at least one client device as claimed by Applicant. Matsumoto however teaches a serial I/O circuit with an automatic transfer function, which notifies the system if an error occurred in the data (col. 6, lines 6-56).

It would have been obvious to one of ordinary skill in the art at the time of the invention for Arimilli in further view of Moran to further include Matsumoto's automatic transfer circuit into his own NUMA data processing system. By doing so, Arimilli would benefit by having a means notifying nodes within his network system of data errors. By exploiting Matsumoto's notification process, Arimilli could greatly reduce the amount of labor required to re-transfer the correct data as taught by Matsumoto in col. 5, line 54 through col. 6, line 3.

Response to Arguments

8. Applicant's amendments and arguments have been fully considered, however they are not persuasive.

Applicant arguments with respect to the 35 U.S.C. 103 rejections begin on page 11 of the remarks section, and include a description of the instant invention, and further allege to overcome all previously cited art. It is worthy to note that the arguments set forth by Applicant are substantially similar to ones presented in the remarks section filed 5 March 2007. Examiner maintains that these arguments are not persuasive for the reason discussed below.

Beginning on page 12, l. 12 through page 13, l. 11 of the remarks, Applicant reiterates arguments established on the record 5 March 2007, and further argues that the prior art of record fails to teach primary and secondary networks as presently claimed in the instant application. More specifically, the arguments presented by Applicant echo those presented by page 13, l. 22 through page 14, l. 17, and page 16, ll. 14-17 the remarks filed 5 March 2007. As such, those arguments are not persuasive as per Examiner's retort in the correspondence made FINAL 14 May 2007. It is further worthy to note that Arimilli's nodes 12 were mapped to Applicant's client device as per page 5, paragraph 006 of the Office action mailed 18 January 2007 (for example). More specifically, nodes 12 (client) are used to connect to a storage system 10 containing a storage device (storage device), via a switch 15 (relay device). It is further clear from Examiner's previous rejection that the teachings of Arimilli in view of Moran, rather than Arimilli alone, were used to address a relay device including a cache disk module for caching data being transferred between the storage device and the at least one client.

Applicant's contention that Moran fails to teach primary and secondary networks (page13, ll. 7-11) as presently claimed is not persuasive, as Examiner maintains that Arimilli in view of Moran render the claims containing these limitations (e.g. 1, 3, 11 and 19), obvious as per the rejections set forth *supra*.

Applicant additional argues (page 13, l. 24 through page 14, l. 15) that several claimed limitations are allegedly not present in the prior art. Applicant however fails to specifically contrast these limitations with the cited prior art. Examiner maintains that these limitations are in fact rendered obvious as per the rejections presented *supra*.

Lastly, Applicant contends (page 14, ll. 22-25), that the prior art fails to describe primary and secondary networks as being different from one another. Examiner maintains that these limitations are in fact rendered obvious as per the rejections of claims 1, 3, 11, 19 and 20 presented *supra*.

Conclusion

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Craig E. Walter whose telephone number is (571) 272-8154. The examiner can normally be reached on 8:30a - 5:00p M-F.

10. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hyung S. Sough can be reached on (571) 272-6799. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

11. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Craig E Walter/
Patent Examiner, Art Unit 2188

CEW